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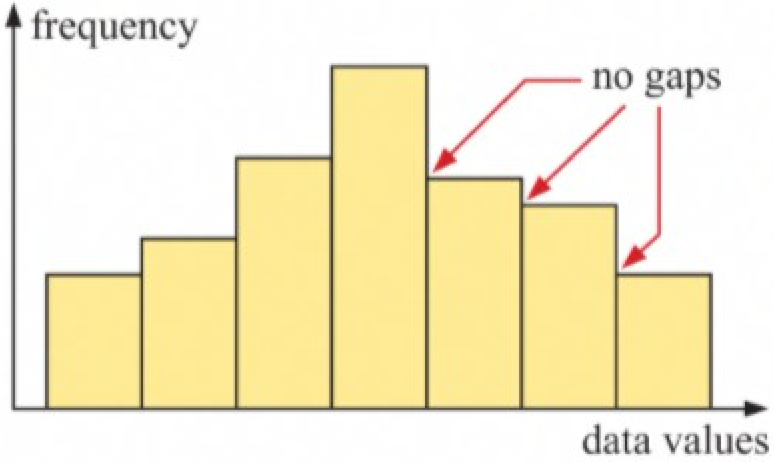
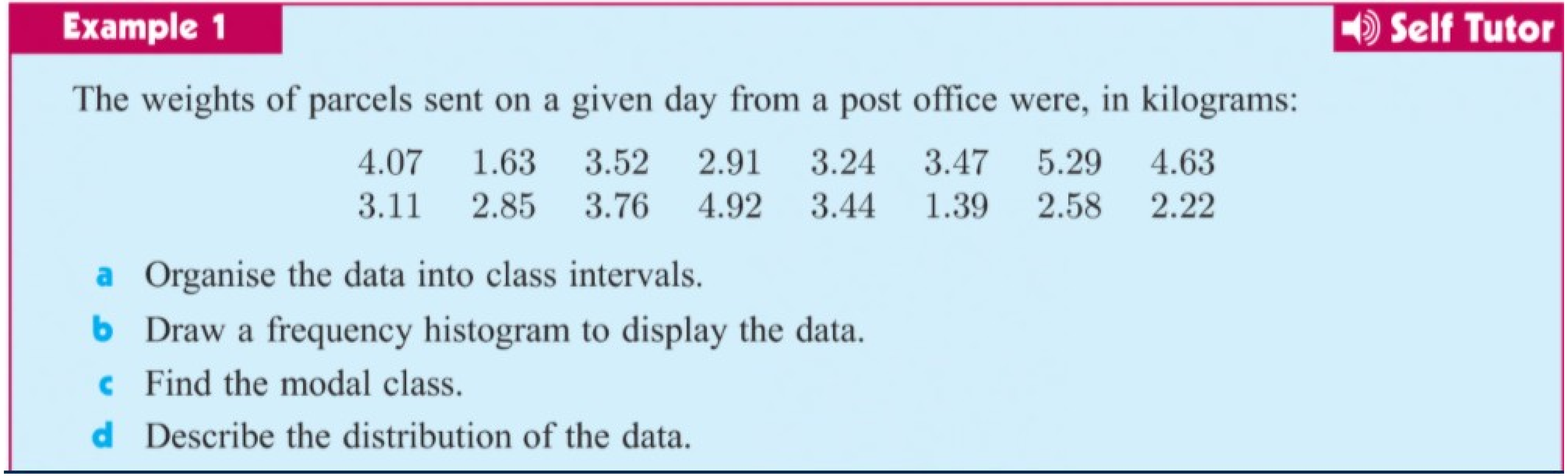
When data is recorded for a continuous variable, there will be many different values. The data is therefore organised using **class intervals**. A **frequency histogram** is used to display the data.

A histogram is similar to a column graph, but because the data is continuous, the columns are joined together.

An example is given alongside.

The **modal class** is the class of values that appears most often. On a histogram, the modal class has the highest column.





Example 1

Self Tutor

The weights of parcels sent on a given day from a post office were, in kilograms:

4.07	1.63	3.52	2.91	3.24	3.47	5.29	4.63
3.11	2.85	3.76	4.92	3.44	1.39	2.58	2.22

a Organise the data into class intervals.

b Draw a frequency histogram to display the data.

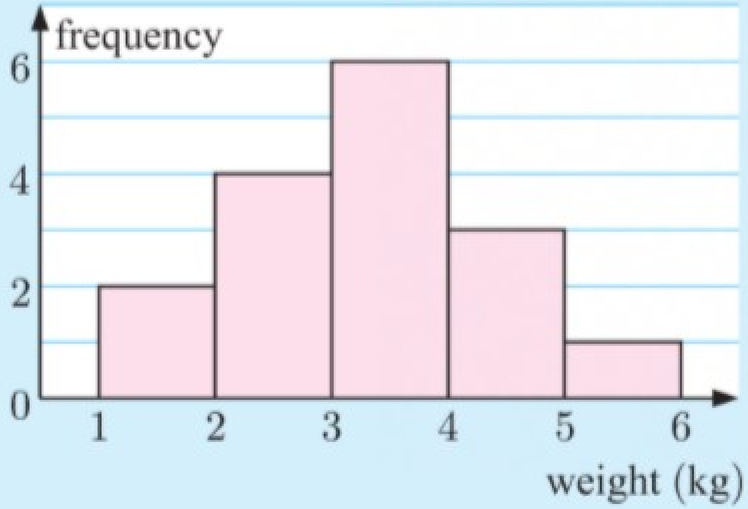
c Find the modal class.

d Describe the distribution of the data.

a The lowest weight recorded was 1.39 kg and the highest was 5.29 kg, so we will use class intervals of 1 kg.
We suppose w is the weight of a parcel.

Weight w (kg)	*Frequency*
$1 \leqslant w < 2$	2
$2 \leqslant w < 3$	4
$3 \leqslant w < 4$	6
$4 \leqslant w < 5$	3
$5 \leqslant w < 6$	1

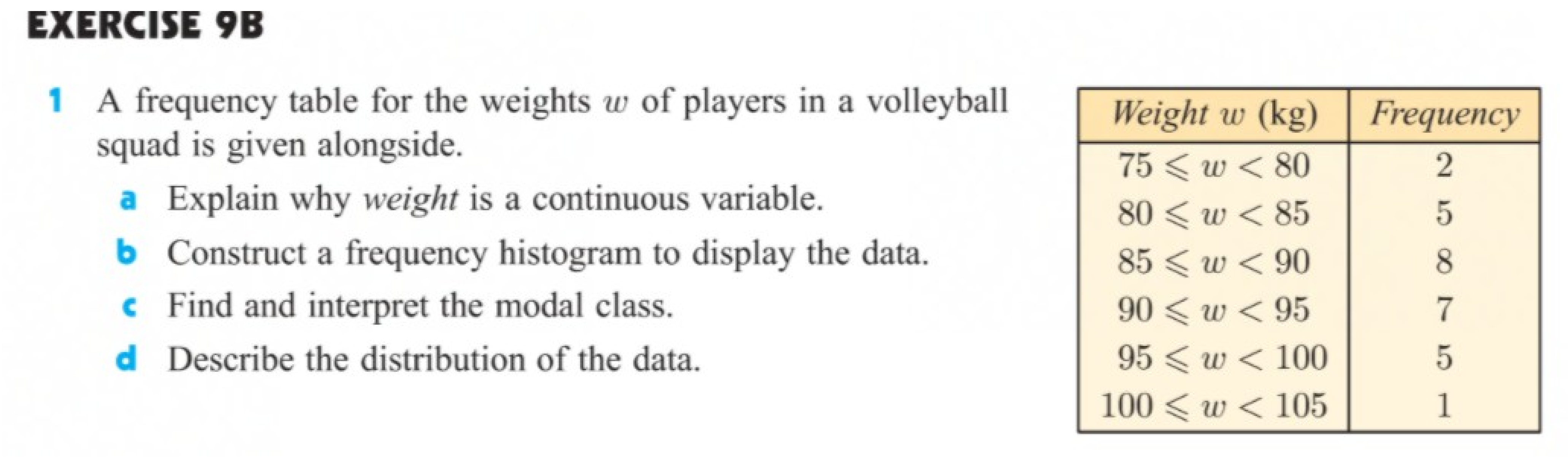
b **Distribution of parcel weights**



c The modal class is $3 \leqslant w < 4$ kg.

d The distribution is approximately symmetrical.

e Of the 16 parcels sent on the one day, $\frac{4}{16} = \frac{1}{4}$ of them weighed more than 4 kg.
$\therefore$ for the next month we expect $\frac{1}{4} \times 564 = 141$ parcels to weigh more than 4 kg.



EXERCISE 9B

1 A frequency table for the weights w of players in a volleyball squad is given alongside.

a Explain why *weight* is a continuous variable.

b Construct a frequency histogram to display the data.

c Find and interpret the modal class.

d Describe the distribution of the data.

Weight w (kg)	*Frequency*
$75 \leqslant w < 80$	2
$80 \leqslant w < 85$	5
$85 \leqslant w < 90$	8
$90 \leqslant w < 95$	7
$95 \leqslant w < 100$	5
$100 \leqslant w < 105$	1

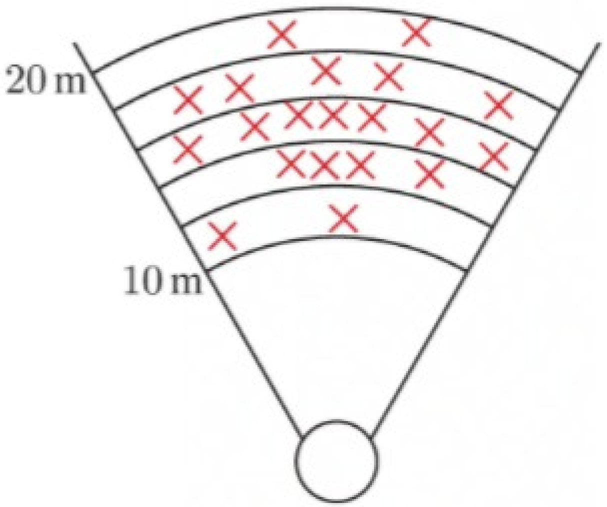
2 A plant inspector takes a random sample of seedlings from a nursery, and measures their height h in millimetres.

The results are shown in the table alongside.

Height h (mm)	*Frequency*
$20 \leqslant h < 40$	4
$40 \leqslant h < 60$	17
$60 \leqslant h < 80$	15
$80 \leqslant h < 100$	8
$100 \leqslant h < 120$	2
$120 \leqslant h < 140$	4

- **a** How many of the seedlings are 100 mm or more?
- **b** What percentage of the seedlings are between 60 and 80 mm?
- **c** Represent the data on a frequency histogram.
- **d** Find the modal class.
- **e** Describe the distribution of the data.
- **f** There are 857 seedlings in the nursery. Estimate the number of seedlings which measure:
  - **i** less than 100 mm
  - **ii** between 40 and 100 mm.

3



During a training session, Daniel performed 20 throws of the shot put. The results of the throws are shown alongside.

a Organise the data into class intervals.

b Draw a histogram to display the data.

c Find the modal class.

d Describe the distribution of the data.

4 A group of athletics students obtained the following times, in seconds, for running 200 metres:

26.57 25.22 27.09 26.44 24.13 27.83 25.72 26.40
23.12 27.44 24.76 25.09 28.70 26.13 23.94 27.23
26.35 28.91 26.30 27.02 24.19 25.27 27.45 26.45
27.40 27.22 25.88 23.50 26.49 27.19 28.37 25.17
28.08 26.80 28.14 26.82 27.66 25.41 24.89 27.92

a Organise the data into class intervals.

b What percentage of the students obtained a time faster than 25 seconds?

c Draw a histogram to display the data.

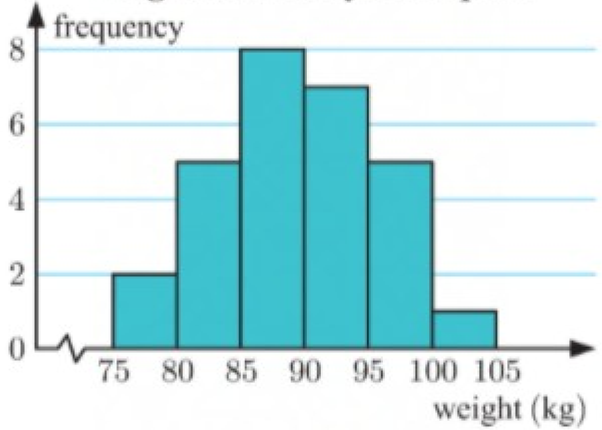
d Find the modal class.

e Describe the distribution of the data.

EXERCISE 9B

1 **a** *Weight* can take any value in the given range, and is measured, not counted.

b **Weights of volleyball squad**

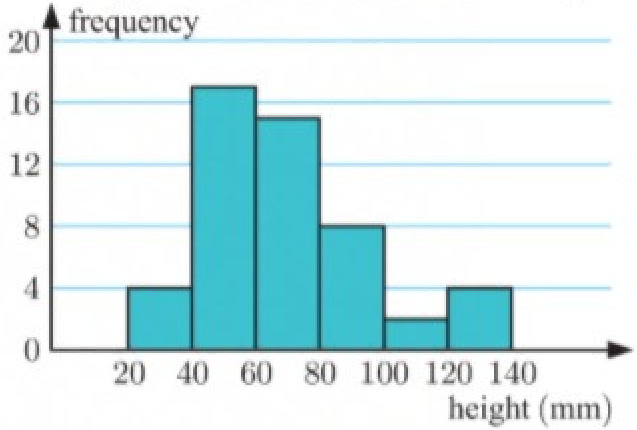


c $85 \leqslant w < 90$ kg. More people in the volleyball squad have weights between 85 and 90 kg than in any other interval.

d approximately symmetrical

2 **a** 6 seedlings **b** 30%

c **Heights of seedlings in a nursery**



d $40 \leqslant h < 60$ mm **e** positively skewed

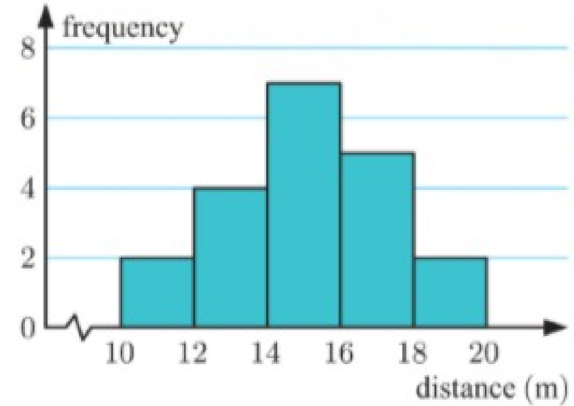
f **i** ≈ 754 seedlings **ii** ≈ 686 seedlings

3 **a**

Distance d (m)	*Frequency*
$10 \leqslant d < 12$	2
$12 \leqslant d < 14$	4
$14 \leqslant d < 16$	7
$16 \leqslant d < 18$	5
$18 \leqslant d < 20$	2

b

Shotput distances thrown



c $14 \leqslant d < 16$ m

d approximately symmetrical

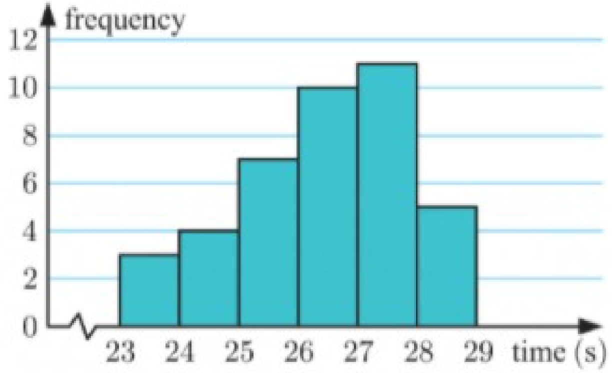
4 **a**

Time t (s)	*Frequency*
$23 \leqslant t < 24$	3
$24 \leqslant t < 25$	4
$25 \leqslant t < 26$	7
$26 \leqslant t < 27$	10
$27 \leqslant t < 28$	11
$28 \leqslant t < 29$	5

b 17.5%

c

200 m times run by athletics students



d $27 \leqslant t < 28$ s

e negatively skewed

1

1

E